



## Faculty of Applied Sciences

### AMCO2183 **Mechanic of structures**

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

**Teacher(s):** Jean-François Remacle  
**Language:** French  
**Level:** Second cycle

#### **Aims**

Given the precept of structure modeling (linear elasticity and static analysis)

#### **Main themes**

- Analysis of various classes of elastic structures
- Static finite element analysis of structures, including elastic stability
- Introduction to finite element softwares

#### **Content and teaching methods**

- Structures
  - \* presentation and identification of different classes of structures
- Modelling of elastic structures
  - \* one dimensional structures : beams, bars, rods, arcs
  - \* deformations due to shear strains: the Timoshenko beam
  - \* plane stress and plane strain states, membranes
  - \* thin plates (Kirchoff model)
  - \* thick plates (Reissner-Mindlin model)
  - \* thin shells
- Finite Elements for Structures
  - \* introduction to the calculus of variations
  - \* variational principles in elasticity, energy principles, Cea's lemma, Hypercircle of Prager and Synge
  - \* finite element models for different classes of structures
  - \* special issues: shear locking, patch test, thin plates and C1 continuity, boundary conditions
  - \* numerical implementation using MATLAB
- Numerical softwares
  - \* principles, functionalities
  - \* pre and post-processing, mesh generation
  - \* validation and verification, error estimation
  - \* applications

**Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)**

Naught

**Other credits in programs**

<b>ARCH22</b>	Deuxième année du programme conduisant au grade d'ingénieur civil architecte	(5 credits)	Mandatory
<b>ARCH23</b>	Troisième année du programme conduisant au grade d'ingénieur civil architecte	(5 credits)	
<b>FSA3DS/GC</b>	Diplôme d'études spécialisées en sciences appliquées (génie civil)	(5 credits)	
<b>GC22</b>	Deuxième année du programme conduisant au grade d'ingénieur civil des constructions	(5 credits)	Mandatory
<b>GC23</b>	Troisième année du programme conduisant au grade d'ingénieur civil des constructions	(5 credits)	
<b>MECA22</b>	Deuxième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	
<b>MECA23</b>	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	